sociation-curve of the hæmoglobin as an indicator of the reaction of the blood, and contains a wealth of interesting observations on the effects of diet, exercise, residence at high altitudes, and finally, certain pathological conditions associated with acidosis. The author is to be congratulated on the production of a book interesting not to physiologists only. The lively personal note of the narrative is a happy novelty in a physiological monograph, and will enable those of his readers who have not worked with him to appreciate and, in a measure, to partake of the genial optimism of the author. E. H. S.

GYROSCOPIC MOTION.

An Elementary Treatment of the Theory of Spinning Tops and Gyroscopic Motion. Second edition. By H. Crabtree. Pp. xv + 193. (London: Longmans, Green and Co., 1914.) Price 7*s.* 6*d.* net.

IN this, the second edition of Crabtree's admirable book, the text and paging of the first edition have been followed, but additions have been made where necessary, so that more recent developments may be dealt with. The first edition was noticed in NATURE (August 12, 1909, p. 182), so that it is not necessary to do more now than refer to the additional matter. The two monorail systems of Brennan and Schilowsky are illustrated and described. It may be mentioned that each of these derive their stability from a gyrostatic system, the action of which is independent of the forward motion of the car, so that the stability exists whether the car is moving forwards or backwards or is at rest, and in this respect differs entirely from the systems more recently invented by Dr. Gray.

There is a full discussion of the Anschütz gyro compass, but this is the same as that which is given in the manual published by Messrs. Elliot Bros., having been translated for them by the author and his colleagues. The writer of this notice hoped to have found also a description of the Sperry gyro compass, which differs in certain respects very materially from its forerunner, the Anschütz. A discussion by the author of the relative merits of the two systems where they differ would have been very illuminating. Unfortunately, this instrument is not mentioned. Other matters ably dealt with in the appendices are the swerving of golf-balls and the drifting of rifled projectiles, both subjects on which amazing nonsense is often written.

There is a statement in the earlier part of the book on the skidding of motor-bicycles, with which the present writer does not agree. Seeing that the back tyre is being constantly impelled to slip longitudinally on the ground by successive explosions in the cylinder, more especially where a rigid chain drive is employed, or where the flywheel of the engine is insufficient, and that a longitudinal slip will start a side slip, there is abundant cause for the side-slipping capacity of these machines, without looking to more subtle causes. Briefly, the author explains that in consequence of the gyrostatic action of the flywheel a transverse couple must be applied in order to make the flywheel's plane of rotation change when the machine is describing a curve. In order to apply this, the rider and machine must lean over to a very small extent more than would be necessary otherwise. So far so good; the transverse couple is caused by the weight of the whole combination of machine and rider acting vertically downwards, and a corresponding reaction at the road acting vertically upwards, and the arm of the couple is the excess of the horizontal distance between the centre of gravity and the wheel base due to the extra leaning. The transverse force on the road, which alone gives rise to side slip, is unchanged.

It is satisfactory to find that there is a sufficient demand for a book of such thoroughness as this to have called for a second edition in a comparatively short time. C. V. BOYS.

BRITISH FLOWERING PLANTS.

British Flowering Plants. Illustrated by Three Hundred Full-page Plates, reproduced from Drawings by Mrs. Henry Perrin. With Detailed Descriptive Notes and an Introduction by Prof. G. S. Boulger. Vol. i. Pp. xlv + plates. (London: Bernard Quaritch, 1914.)

MRS. PERRIN'S book, of which the first volume is before us, is essentially a book for the use of ladies and those who take a dilettante interest in botany and flowers. It is unfortunate, therefore, that it is of such a weight that its presumed readers may scarcely have the strength or energy to handle the bulky tomes.

Not only are the plates heavily loaded with plaster of Paris, but the large quarto pages of text are of almost equal solidity. If the contents of the book were of any scientific interest or formed a real addition to knowledge, the great bulk of the volume would be a matter of sincere regret; we cannot, however, foresee any particular use for the book, except that its handsome back may adorn the shelves of an expensive library, and can only deplore that the money expended on this production could not have been put to some object of definite botanical value.

The paintings, which afford the *raison d'être* of the book, are on the whole good, though in

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many cases a more artistic arrangement of the material might have been achieved. Some pictures, as that of the snowdrop, for instance, are unworthy of the book. To the botanist the pictures are of little value, owing to the absence of an analysis of the parts of the flower and fruit, and this defect is especially noticeable in the case of the plates of the bulrush and Luzula, which give no indication of the structure of the flowers. It may be urged that such details are relegated to special plates, but even then they are so poorly executed and often on so small a scale as to be of little assistance. It is unfortunate that the artist, who undoubtedly possesses considerable skill and has bestowed so much labour on her drawings, had not sought the best advice as to the way in which she might have made her pictures of value.

The notes supplied by Prof. Boulger are full of useful information and make pleasant, if not very strenuous, reading. We doubt, however, owing to the bulk of the book, if they will receive very serious attention. He has collected together a good deal of curious and out-of-the-way information under the different plants which it is well to bring to the notice of students and those interested in flowers. In addition to the ancient lore the correct naming of the plants is fully treated, and a considerable amount of recent work of interest is incorporated as occasion demands.

Information about the habitats and general condition of life of the different plants figured is also given. In the introduction a useful outline of general floral morphology and classification is to be found, and the plates with their pages of text follow. The plants figured in the volume include the British conifers, certain monocotyledons, the willows, oak, beech, and allied trees, the nettles, Polygonaceæ, Caryophyllaceæ, and a few others.

PHYSICAL CHEMISTRY.

(1) *The Theory of the Solid State.* Based on Four Lectures delivered at University College, London, in March, 1913. By Prof. W. Nernst. Pp. viii + 104. (London: Hodder and Stoughton, 1914.) Price 2*s*. 6*d*. net.

(2) *Lehrbuch der physikalischen Chemie.* By Dr. K. Jellinek. Band i. Die Lehre von den Aggregatzuständen, Teil I. Pp. xxxvi + 732. (Stuttgart: F. Ende, 1914.) Price 24 marks.

(3) *Complex Ions in Aqueous Solutions.* By Dr. A. Jaques. Pp. vi + 151. (London: Longmans, Green and Co., 1914.) Price 4*s*. 6*d*. net.

(1) THOSE who had the opportunity of hearing Prof. Nernst deliver his short course of lectures at University College, London, on the Quantum Theory as applied to the solid state of matter will welcome this somewhat belated publication. The book is a masterpiece of lucid condensation, covering as it does in a small number of pages the whole range of modern work on the thermal properties of solids. The limitations of the Dulong-Petit generalisation are briefly discussed. The necessity for the introduction of some new hypothesis in place of equipartition is made clear, and the fortunate application of Einstein of the Planck quantum concept to the heat capacity of vibrating atoms is shown to point the way to a new understanding of the baffling problem of the solid state. The Nernst-Lindemann empirical modification of the Einstein formula is touched upon, and later the more theoretically significant expression of Debye.

Whilst fully realising the great progress which has been made by the introduction of the quantum theory to the thermal properties of solids (and gases and liquids for that matter), it would be idle to pretend that everything is at present on a sure and certain basis. As a matter of fact nearly every stage bristles with assumptions, and although the general trend is certainly in the right direction, not a few of the assumptions are mutually conflicting. A science in this state is, however, just at its most attractive stage, and the number of investigations cited as references in the book are ample evidence of the interest which the subject has awakened, especially in Germany.

An important feature of the book is the good account of the experimental methods employed in the Berlin laboratory for the determination of specific heats, especially at very low temperatures. Perhaps the most interesting section is that entitled "General law respecting the behaviour of solid bodies at very low temperatures," in which a most suggestive account of present and future problems is given on such subjects as thermal expansion, compressibility, conduction of heat and electricity, thermal e.m.f's, and magnetic susceptibility. It would seem that before long the subject of thermal and electrical conductivity of solids will be a region of controversy between the electron view and the quantum view—which, it is to be hoped, will result in a clearer physical conception of what the quantum really is. It is noteworthy that no mention is made of Sommerfeld's views.

There is no question that during the next decade at least, the most active investigation in theoretical physics and chemistry will consist in the further extension and application of the quantum theory, hence the significance of the present publication which is a most excellent epitome of the subject (so far as it refers to solids), by

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